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AMENDMENTS TO THE CLAIMS

1. (Original) A method for producing micro emulsions dissolved or dispersed in a compressed fluid in a supercritical state comprising:

- introducing a first fluid into a pressurised vessel;
- introducing one or more surfactant/-s into said pressurised vessel;
- introducing a second fluid into said pressurised vessel;
- promoting formation of micro emulsions of said second fluid within said first fluid present in said pressurised vessel;

wherein one of the fluids is water or contains water, and

wherein said water or water mixture further contains one or more substances being dissolved therein.

2-107. Cancelled

108. (New) A method for producing micro or nano emulsions dissolved or dispersed in a compressed fluid in a near critical or a supercritical state comprising:

- introducing a first fluid into a pressurised vessel;
- introducing one or more surfactant(s) into said pressurised vessel;
- introducing a second fluid into said pressurised vessel;
- promoting formation of micro or nano emulsions of said second fluid within said first fluid present in said pressurised vessel;

wherein

- the compressed fluid is CO₂
- one of the fluids is water or contains water,
- the diameter of the core(s) of said micro or nano emulsion(s) is/are at least partly controlled by controlling the density of said fluid(s) present within said pressurised vessel and,

said micro or nano emulsion(s) formed comprises a water core(s).

109. (New) A method according to claim 108, wherein said water or water mixture further contains one or more substances being dissolved therein.

110. (New) A method according to claim 108, wherein said micro emulsion(s) formed is continuously withdrawn from said pressurised vessel.

111. (New) A method according to claim 108, wherein said pressurised vessel is an agitated vessel, and wherein said agitation is provided by a motor driven mixer such as an impeller, said impeller is rotating with a speed in the range 100-5000 rpm, such as an impeller with a rotating speed in the range 250-3000 rpm, and preferably in the range 500-2000 rpm.

112. (New) A method according to claim 108, comprising re-circulating in at least part time of the method at least part of a fluid or fluid mixture present in said pressurised vessel, the re-circulating comprising withdrawing from the vessel at least part of a fluid contained in said vessel and feeding it to a re-circulation loop and subsequently feeding it back to said pressurised vessel, the method further comprising the step of controlling the temperature of the fluid in the re-circulation loop, wherein the fluid volume being withdrawn from said vessel to said re-circulation loop corresponds to exchange of at least 0.1 vessel volume per minute such as at least 0.25 vessel volumes per minute, preferably the fluid volume corresponds to exchange of least 0.5 vessel volumes per minute, and even more preferably exchange of at least 1 vessel volume per minute and advantageously the fluid volume being withdrawn corresponds to exchange of at least 2 vessel volumes per minute such as exchange of at least 5 vessel volumes per minute, and wherein said re-circulation loop comprises at least one mixing zone for promoting formation of micro emulsion(s).

113. (New) A method according to claim 112, wherein said mixing zone(s) in said re-circulation loop comprise(s) a static mixer.

114. (New) A method according to claim 112, wherein said mixing zone(s) in said re-circulation loop comprises a pressurised container with a high shear rate mixer, and wherein said high shear rate mixer comprises a motor driven mixer such as an impeller such as a propeller or turbine rotor.

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115. (New) A method according to claim 114, wherein said impeller comprises a stator and a rotor, wherein said high shear rate mixing is obtained by maintaining the distance from the surface of rotor to the surface of the stator below 5 mm, such as a distance of below 2.5 mm, and preferably below 1 mm such as below 0.5 mm, and advantageously below 0.2 mm, and wherein said high shear rate mixer in said pressurised container in said re-circulation loop comprises a rotor rotating with a speed of at least 5000 rpm such as a speed of at least 10000 rpm, and preferably at a speed of at least 15000 rpm such as a speed of at least 20000 rpm, and advantageously the rotor is rotating at a speed of 24000 rpm or more.

116. (New) A method according to claim 112, wherein said re-circulation loop comprises ultrasonic generating means for generating ultrasonic waves or vibration waves in said fluid being withdrawn to said recirculation loop, wherein the frequency of said ultrasonic generating means are in the range 20 kHz to 10 MHz such as in the range 20 kHz to 2 MHz and preferably in the range 20 kHz to 50 kHz such as in the range 40-50 kHz, and wherein said ultrasonic generating means comprises a piezoelectric or magneto-restrictive structure.

117. (New) A method according to claim 116, wherein said ultrasonic generating means are placed within said pressurised container within said re-circulation loop.

118. (New) A method according to claim 112, wherein said mixing in said one or more mixing zone(s) for promoting formation of said micro emulsions is at least partly provided by atomizing said fluid being withdrawn to said re-circulation loop by spraying said fluid into said pressurised container in said re-circulation loop through one or more nozzles.

119. (New) A method according to claim 118, wherein said one or more nozzles comprise(s) one or more membranes situated within said pressurised container within said re-circulation loop.

120. (New) A method according to claim 112 comprising withdrawing from an agitated pressurised vessel at least part of a fluid or a fluid mixture contained in said agitated pressurised vessel and feeding it to a re-circulation loop, said re-circulation loop comprising a pressurised

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container comprising a high shear rate mixer for promoting formation of micro emulsions, and subsequently feeding said fluid or fluid mixture back to said pressurised vessel.

121. (New) A method according to claim 120, wherein said second fluid and/or said surfactant(s) are introduced into said pressurised container in said re-circulation loop.

122. (New) A method according to claim 121, wherein said second fluid and/or said surfactant(s) are premixed prior to introduction into said pressurised container.

123. (New) A method according to claim 108, further comprising withdrawing in at least part time of said method a fluid stream comprising said micro emulsions suspended, dispersed or dissolved in said fluid in a supercritical state.

124. (New) A method according to claim 114, wherein said one or more substances comprises polar molecules and/or polarizable molecules and/or non-polar, non-volatile molecules.

125. (New) A method according to claim 116, wherein said one or more substances is substantially insoluble in said compressed CO₂.

126. (New) A method according to claim 108, wherein said CO₂ containing fluid further comprises at least one co-solvent.

127. (New) A method according to claim 126, wherein the co-solvent is selected from the group consisting of alcohol, water, ethane, ethylene, propane, butane, sulfurhexafluoride, nitrous oxide, chlorotrifluoromethane, monofluoromethane, methanol, ethanol, DMSO, isopropanol, acetone, THF, acetic acid, ethyleneglycol, polyethyleneglycol, N,N-dimethylaniline, and mixtures thereof.

128. (New) A method according to claim 108, wherein said CO₂ containing fluid further comprises one or more surfactant(s), comprising a CO₂-philic portion and a CO₂-phobic portion.

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129. (New) A method according to claim 128, wherein said surfactant(s) is/are chelate(s) and/or fluorinated surfactant(s), and/or perfluoropolyether surfactant(s), and/or fluoroetherfluoracrylate surfactant(s) and/or siloxane surfactant(s).

130. (New) A method according to claim 128, wherein said surfactant(s) is/are selected from the group consisting of hydrocarbons and fluorocarbons preferably having a hydrophilic/lipophilic balance value of less than 15, where the HLB value is determined according to the following formula: $HLB = 7 + \text{sum}(\text{hydrophilic group numbers}) - \text{sum}(\text{lipophilic group numbers})$.

131. (New) A method according to claim 128, wherein the amount of said surfactant(s) compared to the amount of water corresponds to a concentration in the range 0.01 to 10 weight %, such as a concentration in the range 0.05 to 5 weight %, preferably a concentration in the range 0.1 to 3 weight %, and advantageously a concentration in the range 0.5 to 2 weight %.

132. (New) A method according to claim 128, wherein the molar ratio of water to said surfactant(s) is at least 5:1, such as a molar ratio of at least 10:1, preferably a molar ratio of at least 20:1, such as a molar ratio of at least 30:1, and advantageously a molar ratio of at least 50:1 such as at least 100:1.

133. (New) A method according to claim 128, wherein the molar ratio of compressed surfactant to the dissolved and/or dispersed molecules in said second fluid is at the most 100:1, such as at the most 50:1, and preferably at the most 30:1 such as at the most 10:1.

134. (New) A method according to claim 108, wherein the pressure of at least one of said fluids is in the range 50-500 bars, preferably in the range 85-500 bars, such as in the range 100-300 bars.

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135. (New) A method according to claim 108, wherein the temperature in said pressurised vessel is maintained in the range of 20-500 °C, such as 30-450 °C, and preferably in the range of 35-200 °C, and more preferably in the range of 40-150 °C.

136. (New) A method according to claim 108, wherein said pressurised vessel is operating at a substantially constant pressure.

137. (New) A method according to claim 108, wherein said micro emulsion(s) containing fluid being withdrawn from said pressurised vessel is used to dissolve and/or extract substances from a material in a device outside of said pressurised vessel.

138. (New) A method according to claim 108, wherein said water core comprises dissolved and/or dispersed substances and said fluid(s) containing said micro emulsion(s) is/are used as carrier(s) for transporting dissolved and/or dispersed species to an external device.

139. (New) A method according to claim 108, wherein two or more micro emulsions of different compositions are produced in separate pressurised vessels and the fluids containing said micro emulsions are combined in an external device.

140. (New) A method according to claim 139, wherein said two emulsions of different composition are formed using at least two different surfactants.

141. (New) A method according to claim 140, wherein said surfactants are designed with electrostatic forces so as to facilitate contact of micelles of different types and to reduce merging of micelles of the same type.

142. (New) A method according to claim 141, wherein said electrostatic forces are introduced by including a molecular charge displacement in the lipophilic part of the surfactant.

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143. (New) A method according to claim 142, wherein said molecular charge displacement are obtained by introducing polarity from organic molecular groups selected from halogenated alkyls and/or halogenated aryls and/or aldehydes, and/or ketones and/or ethers and/or hetero-cyclic structures containing oxygen, nitrogen and/or sulphur and/or amides and/or mercaptanes.

144. (New) A method according to claim 108, wherein said micro emulsion(s) is/are used as nanoreactors for synthesis of nanoparticle materials.

145. (New) A method according to claim 144, wherein at least one chemical reaction is occurring in said micro emulsions.

146. (New) A method according to claim 144, wherein said micro emulsion(s) is/are used as template(s) for controlling said particulate material into a specific shape, size and/or structure.

147. (New) A method according to claim 139, wherein the average size of said nanoparticle material formed is maximum 5000 nm, such as an average size of maximum 500 nm, preferably the average size is maximum 100 nm, and most preferably the average size is maximum 30 nm, such as maximum 15 nm.

148. (New) A method according to claim 139, wherein the average size of said nano particle material formed is in the range 0.1-30 nm, such as in the range 1-10 nm.

149. (New) A method according to claim 144, wherein said synthesis of said nanomaterials is at least partly controlled by controlling the temperature and/or the pressure of the fluid(s) during said synthesis.

150. (New) A method according to claim 119, wherein said one or more membranes comprises the inner wall of said pressurised container within said re-circulation loop.

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151. (New) A method according to claim 150, wherein said pressurised vessel comprises ultrasonic generating means.

152. (New) A method according to claim 151, wherein said pressurised vessel further comprises one or more atomising nozzles.

153. (New) A method according to claim 152, wherein said atomising nozzles comprise at least one ultrasonic nozzle.

154. (New) A method according to claim 108, wherein said pressurised vessel comprises a plurality of hollow tubular members, at least part of the walls of said hollow tubular members comprising membranes, the plurality of hollow tubular members defining interstices therebetween allowing for flow and

- Contacting the outer surface of a plurality of said hollow tubular members with a first fluid, and
- Contacting a second fluid with the inner surface of said hollow tubular members, at least part of said second fluid is permeating said membrane walls forming a plurality of emulsion(s) of said second fluid dispersed in said first fluid.

155. (New) A method according to claim 154, wherein

- the membrane part of said hollow tubular members comprises porous membranes,
- the pore size of said porous membranes is in the range 0.001-100 microns, such as a pore size in the range 0.01-10 micron, and preferably having pores in the range 0.01-0.2 micron,
- the diameter of said water core in the emulsions formed is in the range 0.001-30 times the diameter of the pores of the membrane part of said hollow tubular members, such as in the range 0.01-15 times the diameter of the pores of the membrane part of said hollow tubular members, and preferably in the range 0.1-10 times the diameter of the pores of

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said hollow tubular members, and

- the pressure of the fluid(s) contacting the inner surface of said hollow tubular members is higher than the pressure of the first fluid,

the pressure differences between the fluid(s) contacting the inner surface of said hollow tubular members and the first fluid is in the range 0.1-100 bars, such as in the range 0.1-50 bars, and preferably in the range 0.1-20 bars such as in the range 0.1-10 bars.

156. (New) A method according to claim 154, wherein said hollow tubular members comprise hollow fibres.

157. (New) A method according to claim 154, wherein said membrane is a ceramic or polymeric membrane.

158. (New) A method according to claim 154, wherein the temperature profile within said pressurized vessel is controlled by controlling the temperature and flow rate of at least one fluid contacting the inner surface of said hollow tubular members.

159. (New) A method according to claim 154, wherein said tubular members comprise two separate sets of hollow tubular members, both sets of said hollow tubular members comprising an inlet and an outlet plenum communicating with the outside of said pressurized vessel, and wherein two separate fluids may be contacted with the inner surface of said hollow tubular members, and wherein two different emulsions of said fluids in said first fluid contacting the outer surface of said hollow tubular members are formed.

160. A method according to claim 108, wherein the first fluid containing said micro emulsion(s) is expanded in a device external to the pressurised vessel.

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161. (New) A method according to claim 160, wherein the first fluid is rapidly expanded through one or more nozzles using a RESS or a RESOLV technique.

162. (New) A method according to claim 160, wherein the content of said micro emulsions formed is deposited on the surface of a substrate such as on the surface of solid material.

163. (New) A method according to claim 138, wherein said external device is a device for producing fine particles and contains a solvent and said fine particles are collected as a dispersion of said fine particles within said solvent.

164. (New) An apparatus comprising means according to claim 108 being adapted to carry out the method according to claim 108.